

East Stroudsburg University Upward Bound
Pre-Calculus Summer 2009
11:00 AM – 12:20 PM Monday - Thursday 6/22 – 7/30 Stroud 315

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Instructional Resources: Pre-Calculus, Sullivan & Sullivan, Prentice Hall 4th Edition
Calculator
Pencil, Eraser

Topics covered: Basic Geometry & Graphing
Functions and their properties
Polynomial and Rational Functions
Exponential & Logarithmic Functions
Trigonometric Functions
Analytic Trigonometry

Learning Outcomes: At the conclusion of this course a student will know:

Outcome 1: Students will demonstrate the ability to define trigonometric ratios and apply trigonometry to solve real-world problems.

Content Outcomes	Instructional Activities / Strategies	Evaluation / Assessment
<ul style="list-style-type: none">• Define and evaluate the six trigonometric ratios.• Solve triangles using trigonometric ratios.• Define radian measure and convert angle measures between degrees and radians.• Define the trigonometric functions in terms of the unit circle.• Develop basic trigonometric identities.• Use trigonometric functions to model and solve real-world problems, including right triangle relations, arc length, and speed.	<ul style="list-style-type: none">• Group work to review concepts• Schedule remediation time for with any students who need extra help.	<ul style="list-style-type: none">• Teacher designed tests and quizzes• Activities which demonstrate knowledge of the concepts taught• Homework• Class participation• Worksheets designed to demonstrate knowledge of the concepts taught• Group assessment

Outcome 2: Students will demonstrate the ability to sketch and analyze trigonometric graphs and apply trigonometry to solve real-world problems.

Content Outcomes	Instructional Activities / Strategies	Evaluation / Assessment
<ul style="list-style-type: none">• Graph the sine, cosine, and tangent functions.• Identify the domain and range of a basic trigonometric function.• Graph transformations of the sine, cosine, and tangent graphs.• Graph the cosecant, secant, and cotangent functions and their transformations.• Identify and sketch the period, amplitude (if any), and phase shift of the cosine, sine, and tangent functions.• Use trigonometric graphs to model and solve real-world problems.	<ul style="list-style-type: none">• Group work to review concepts• Schedule remediation time for with any students who need extra help.	<ul style="list-style-type: none">• Teacher designed tests and quizzes• Activities which demonstrate knowledge of the concepts taught• Homework• Class participation• Worksheets designed to demonstrate knowledge of the concepts taught• Group assessment

Outcome 3: Students will demonstrate the ability to solve trigonometric equations, investigate inverse trigonometric functions, and use trigonometric identities.

Content Outcomes	Instructional Activities / Strategies	Evaluation / Assessment
<ul style="list-style-type: none"> • Solve trigonometric equations graphically and algebraically. • Define the domain and range of the inverse trigonometric functions. • Write a trigonometric function to model and solve real-world problems. • Apply strategies to prove identities. • Use the addition and subtraction identities for sine, cosine, and tangent functions. • Use the double-angle and half-angle identities. • Use identities to solve trigonometric equations. • Solve triangles using the Law of Cosines. • Solve triangles using the Law of Sines. 	<ul style="list-style-type: none"> • Group work to review concepts • Schedule remediation time for with any students who need extra help. 	<ul style="list-style-type: none"> • Teacher designed tests and quizzes • Activities which demonstrate knowledge of the concepts taught • Homework • Class participation • Worksheets designed to demonstrate knowledge of the concepts taught • Group assessment

Outcome 4: Students will demonstrate the ability to explore conic sections algebraically and graphically.

Content Outcomes	Instructional Activities / Strategies	Evaluation / Assessment
<ul style="list-style-type: none"> • Define a circle and write its equation. • Analyze and sketch the graph of a circle. • Define an ellipse and write its equation. • Analyze and sketch the graph of an ellipse. • Define a hyperbola and write its equation. • Analyze and sketch the graph of a hyperbola. • Define a parabola and write its equation. • Analyze and sketch the graph of a parabola. • Write the equation of and graph a translated conic section. • Use conic sections to model and solve real-world problems 	<ul style="list-style-type: none"> • Group work to review concepts • Schedule remediation time for with any students who need extra help. 	<ul style="list-style-type: none"> • Teacher designed tests and quizzes • Activities which demonstrate knowledge of the concepts taught • Homework • Class participation • Worksheets designed to demonstrate knowledge of the concepts taught • Group assessment

Outcome 5: Students will demonstrate the ability to identify and evaluate arithmetic and geometric sequences and series

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<ul style="list-style-type: none">• Identify and graph an arithmetic sequence.• Write an arithmetic sequence recursively and explicitly.• Use summation notation.• Find the nth term and the nth partial sum of an arithmetic sequence.• Recognize a geometric sequence.• Write a geometric sequence recursively and explicitly.• Find partial sums of a geometric sequence.• Find the sum of an infinite geometric series.	<ul style="list-style-type: none">• Group work to review concepts• Schedule remediation time for with any students who need extra help.	<ul style="list-style-type: none">• Teacher designed tests and quizzes• Activities which demonstrate knowledge of the concepts taught• Homework• Class participation• Worksheets designed to demonstrate knowledge of the concepts taught• Group assessment

Outcome 6: Students will demonstrate the ability to solve equations and use function notation. The students will develop skills in constructing and interpreting graphs of functions.

Content Outcomes	Instructional Activities / Strategies	Evaluation / Assessment
<ul style="list-style-type: none"> • Solve absolute-value, radical, and fractional equations. • Determine whether a relation is a function. • Determine the domain of a function. • Evaluate piecewise-defined and greatest integer functions. • Analyze graphs to determine domain and range, local maxima and minima, and • Intervals where they are increasing and decreasing. • Find the vertex and intercepts of a quadratic function and sketch its graph. • Transform graphs of parent functions. • Determine whether a graph is symmetric with respect to the x-axis, y-axis, and/or • Origin. • Perform addition, subtraction, multiplication, division, and composition of functions. • Define inverse relations and functions and determine whether an inverse relation is a function. • Verify inverses using composition. 	<ul style="list-style-type: none"> • Group work to review concepts • Schedule remediation time for with any students who need extra help. 	<ul style="list-style-type: none"> • Teacher designed tests and quizzes • Activities which demonstrate knowledge of the concepts taught • Homework • Class participation • Worksheets designed to demonstrate knowledge of the concepts taught • Group assessment

Outcome 7: Students will demonstrate the ability to solve polynomial equations and sketch and analyze graphs of polynomial and rational functions.

Content Outcomes	Instructional Activities / Strategies	Evaluation / Assessment
<ul style="list-style-type: none"> • Divide polynomials. • Apply the Remainder and Factor Theorems. • Determine the maximum number of zeros of a polynomial. • Find all rational zeros of a polynomial. • Simplify and perform operations on complex numbers. • Solve for the complex zeros of a polynomial. • Analyze and sketch polynomial functions using continuity, end behavior, intercepts, and points of inflections. • Use polynomial functions to model and solve real-world problems. • Find the domain of a rational function. • Identify intercepts, holes, vertical, horizontal, and slant asymptotes in order to sketch graphs of rational functions. 	<ul style="list-style-type: none"> • Group work to review concepts • Schedule remediation time for with any students who need extra help. 	<ul style="list-style-type: none"> • Teacher designed tests and quizzes • Activities which demonstrate knowledge of the concepts taught • Homework • Class participation • Worksheets designed to demonstrate knowledge of the concepts taught • Group assessment

Outcome 8: Students will demonstrate the ability to use the laws of exponents and logarithms and apply them to real-world situations.

Content Outcomes	Instructional Activities / Strategies	Evaluation / Assessment
<ul style="list-style-type: none"> • Simplify expressions containing radicals or rational exponents. • Graph and identify transformations of exponential functions, including the number e. • Use exponential functions to model and solve real-world problems. • Graph and identify transformations of logarithmic functions. • Evaluate logarithms to any base with and without a calculator. • Apply properties and laws of logarithms to simplify and evaluate expressions. • Solve exponential and logarithmic equations. • Use exponential, logarithmic, and logistic models to solve real-world problems. 	<ul style="list-style-type: none"> • Group work to review concepts • Schedule remediation time for with any students who need extra help. 	<ul style="list-style-type: none"> • Teacher designed tests and quizzes • Activities which demonstrate knowledge of the concepts taught • Homework • Class participation • Worksheets designed to demonstrate knowledge of the concepts taught • Group assessment

Outcome 9: Students will demonstrate the ability to calculate limits algebraically and estimate limits from graphs and tables of values.

Content Outcomes	Instructional Activities / Strategies	Evaluation / Assessment
<ul style="list-style-type: none"> • Use the informal definition of limit. • Use and apply the properties of limits to find the limit of various functions. • Find one-sided limits. • Determine if a function is continuous at a point or an interval. • Find the limit as x approaches infinity. 	<ul style="list-style-type: none"> • Group work to review concepts • Schedule remediation time for with any students who need extra help. 	<ul style="list-style-type: none"> • Teacher designed tests and quizzes • Activities which demonstrate knowledge of the concepts taught • Homework • Class participation • Worksheets designed to demonstrate knowledge of the concepts taught • Group assessment

Class attendance: Refer to student handbook. This is an 80 minute class. There are no breaks. Please be sure all necessary eating, phone calls, and bathroom activities are taken care of prior to class time. A beverage during class is acceptable (coffee, water, etc). This 80 minute class time is ours together only.

Inclement weather: Refer to student handbook

Methods of Instruction and Evaluation:

A combination of methods (including lecture, discussion, discovery techniques and problem-solving) is used in this course. Every effort is made to involve the student in the doing of mathematics, since it is only in the doing of mathematics that one can learn something of the nature and thought processes of mathematics. The student will be evaluated on the basis of performance on weekly tests, homework, and class participation.

Six weekly tests at 100 pts each	600
Homework & class participation	100
Total	700

A = 630 – 700 pts B = 560 – 629 pts C = 490 – 559 pts D = 420 – 489 pts

NB: This syllabus is subject to change